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PATENT SPECIFICATION

DRAWINGS ATTACHED

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890,687

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COMPLETE SPECIFICATION

Improvements relating to Dynamo-Electric Machines

We, ASSOCIATED ELECTRICAL INDUSTRIES LIMITED, a British Company of 33 Grosvenor Place, London, S.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to dynamo-electric machines and is specifically concerned with such machines of the totally-enclosed liquid-cooled type.

Electric motors of the above-specified type feature essentially in mining motor equipment for example, and in one well-known construction of such motors the cylindrical yoke of the machine defines the inner wall of a water jacket which at least partly surrounds said yoke. Such a construction whilst providing effective cooling of the machine has the disadvantage that serious corrosion of the cast iron or steel yoke commonly occurs due to the action of the cooling water. Moreover, it is extremely difficult to provide between the yoke and the other machine parts co-acting to form the water jacket joints which are completely water-tight at high water pressures.

According to the present invention a dynamo-electric machine of the type referred to comprises tubing of corrosion resisting metal for carrying the coolant, said tubing being in contact with and/or metallically bonded, such as by welding or brazing, to the yoke of the machine and said tubing being of undulating configuration whereby the tubing has major parts thereof disposed parallel or substantially parallel to the yoke axis.

In machines arranged in accordance with the invention not only is the coolant prevented from coming into contact with the machine yoke, but the necessity for the watertight joints hereinbefore referred to is completely obviated.

The diameter of the tubing is preferably relatively small so that the latter can withstand very high coolant pressures and, if desired, inlet and outlet ports to the tubing may be so arranged as to provide a number of parallel paths for the coolant which will be determined in accordance with permissible pressure drop in the cooling system of the machine.

The invention will now be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a partial longitudinal cross-sectional view of a totally enclosed water cooled electric induction motor having cooling means in accordance with the invention;

Fig. 2 is a sectional view taken along the line A—A of Fig. 1 with the rotor and stator assembly omitted; and

Fig. 3 is a developed view of the yoke of the machine according to Figs. 1 and 2 and illustrates the arrangement of the tubing for carrying the coolant.

Referring to the drawing an electric induction motor comprises the usual rotor and stator elements indicated at 1 and 2 respectively in Fig. 1. The stator 2 is secured to a steel yoke 3 of hollow cylindrical form having its ends closed by plates 4 supporting shaft bearings 5. As can best be seen in Fig. 2 the steel yoke 3 is contained within an outer cylindrical shell 6 and accommodated in the space between the yoke 3 and the shell 6 is an endless cooling tube such as of cupro-nickel or other water resistant metal and which may have for example an outside diameter of $\frac{3}{8}$ of an inch. The tube 7, the undulating configuration of which in the axial direction of the yoke 3, can be observed in Fig. 3 is preferably bonded such as by soft soldering, brazing or welding to the yoke 3 as indicated at 8 over the greater part of the tube length so that good heat transference is obtained from the yoke 3 to the coolant through the metallic bond and the cooling tube 7. In the present embodiment single inlet and outlet ports 9 and 10 are provided at spaced points along the tube so that

[*Price 4s. 6d.*]

the latter is divided into two parallel paths for the cooling water but it will be appreciated that the number of paths for the coolant may be varied according to coolant pressure considerations.

As will be observed from the foregoing the water coolant is contained within the carrying tube 7 and is prevented from coming into contact with the steel yoke of the motor so as to cause corrosion and moreover the cooling arrangement according to the invention obviates the necessity for providing liquid tight joints between the casing and the yoke as heretofore has been required as cases where the yoke and casing define the cooling jacket.

WHAT WE CLAIM IS:—

1. A dynamo-electric machine of the totally enclosed liquid cooled type comprising tubing of corrosion resisting metal for carrying the coolant, said tubing being in contact with and/or metallically bonded to the yoke of the machine and said tubing being of undulating configuration whereby the tubing has major parts thereof disposed parallel or substantially parallel to the yoke axis.

2. A dynamo-electric machine as claimed in claim 1, in which the tubing is bonded to the yoke by soft soldering, welding or brazing.

3. A dynamo-electric machine as claimed in any preceding claim, in which small diameter tubing is employed so that it can withstand very high coolant pressures.

4. An electric induction motor substantially as herein described with reference to and as illustrated by the accompanying drawing.

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PROVISIONAL SPECIFICATION

Improvements relating to Dynamo-Electric Machines

We, ASSOCIATED ELECTRICAL INDUSTRIES LIMITED, a British Company of 33, Grosvenor Place, London, S.W.1, do hereby declare this invention to be described in the following statement:—

This invention relates to dynamo-electric machines and is specifically concerned with such machines of the totally-enclosed liquid-cooled type.

Electric motors of the above-specified type feature essentially in mining motor equipment for example, and in one well-known construction of such motors the cylindrical yoke of the machine defines the inner wall of a water jacket which at least partly surrounds said yoke. Such a construction whilst providing effective cooling of the machine has the disadvantage that serious corrosion of the cast iron or steel yoke commonly occurs due to the action of the cooling water. Moreover, it is extremely difficult to provide between the yoke and the other machine parts co-acting to form the water jacket joints which are completely water-tight at high water pressures.

According to the present invention a dynamo-electric machine of the type referred to comprises tubing of corrosion-resisting metal for carrying the coolant, said tubing being in contact with and/or metallically bonded, such as by welding or brazing, to the yoke of the machine.

In machines arranged in accordance with the invention not only is the coolant prevented from coming into contact with the machine yoke, but the necessity for the water-tight joints hereinbefore referred to is completely obviated.

The tubing of machines according to the invention may be arranged in any convenient manner on the outer cylindrical surface of the machine yoke. For example, the tubing may be arranged in the form of a helix coaxial with the yoke, or alternatively it may undulate in the axial direction of the yoke such that the tubing has major portions thereof spaced at intervals around the yoke and disposed parallel or substantially parallel to the yoke axis.

The diameter of the tubing is preferably relatively small so that the latter can withstand very high coolant pressures and, if desired, inlet and outlet ports to the tubing may be so arranged as to provide a number of parallel paths for the coolant determined in accordance with the permissible pressure drop in the cooling system of the machine.

In one especially contemplated embodiment of the invention a totally-enclosed electric induction motor is provided in accordance with the invention with an endless cooling tube, such as of cupro-nickel, which has an outside diameter of $\frac{3}{8}$ inch for example and which is of undulating configuration in the axial direction of the cylindrical yoke, the tube being welded or brazed over the greater part of its length to the latter so as to provide good heat transference from the yoke to the coolant through the metallic bond and the cooling tube. Single inlet and outlet ports are provided at spaced points along the tube so that the tubing is divided into two parallel paths for the coolant. The motor is otherwise

of conventional construction having rotor and stator members and an outer cylindrical casing and co-operating end shields completely enclosing the machine.

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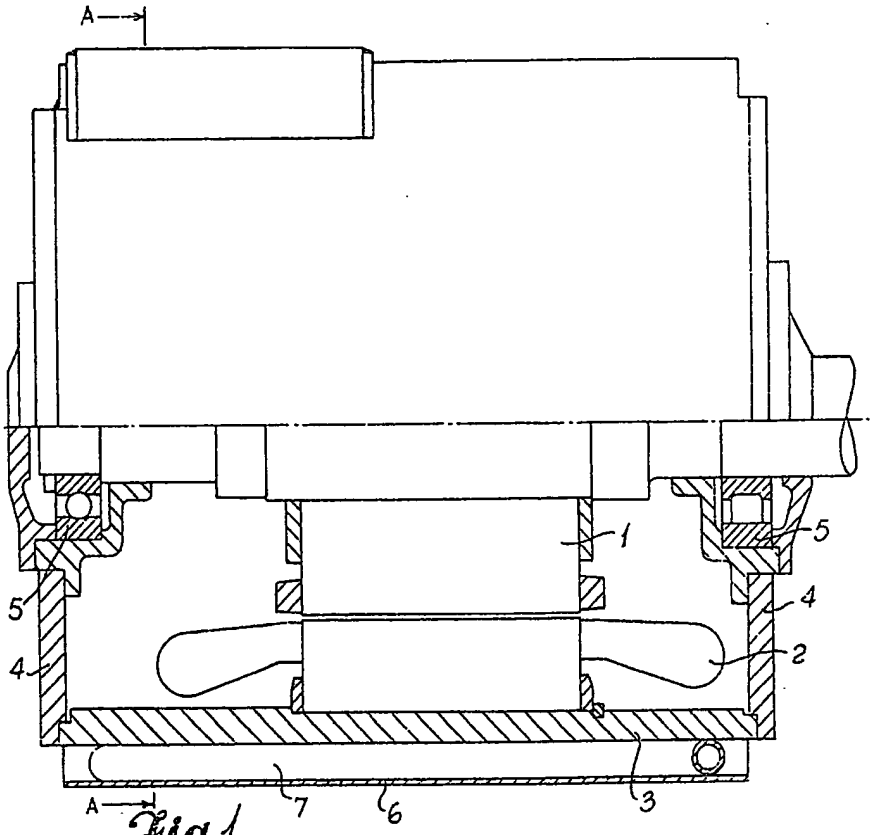
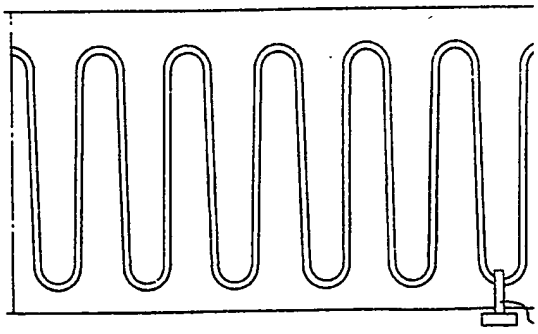


Fig.1.



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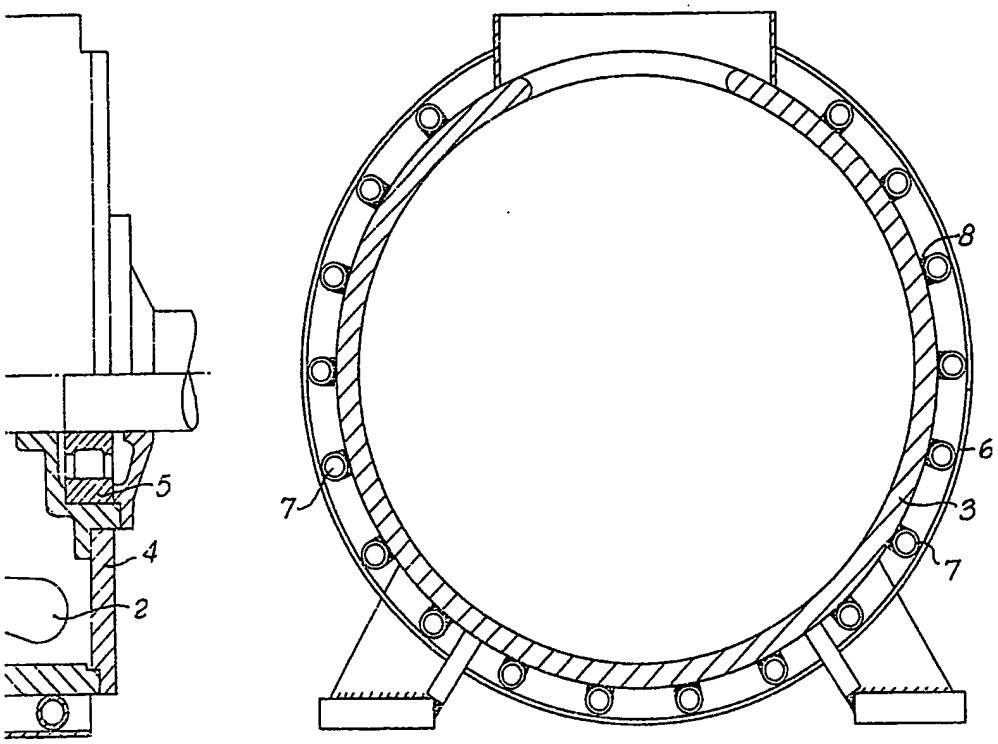

Fig. 2

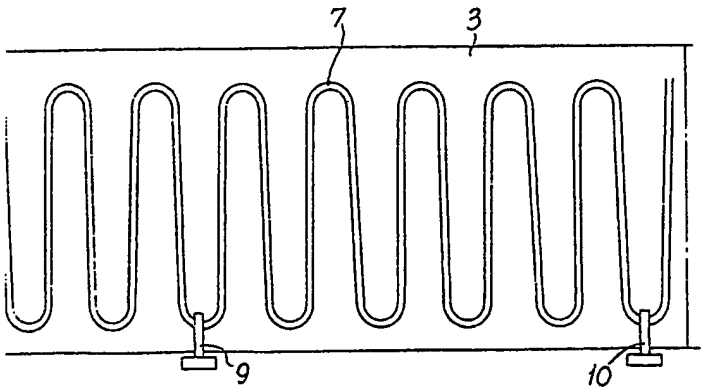

Fig. 3.

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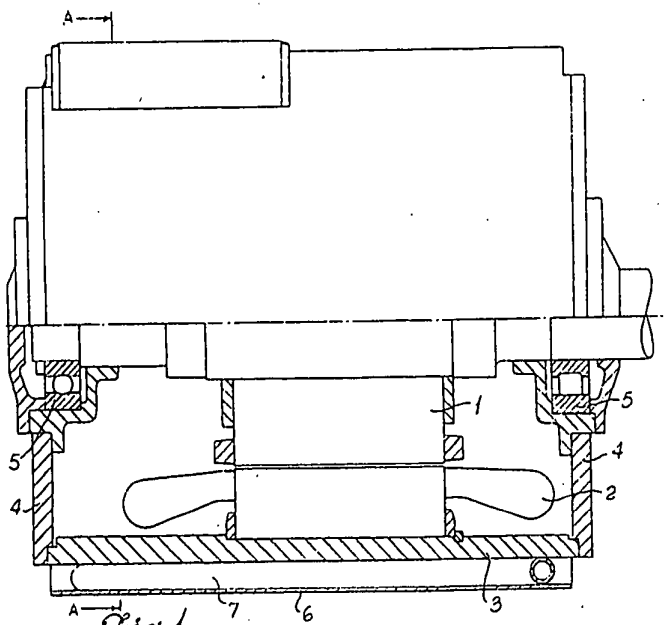

Fig.1.

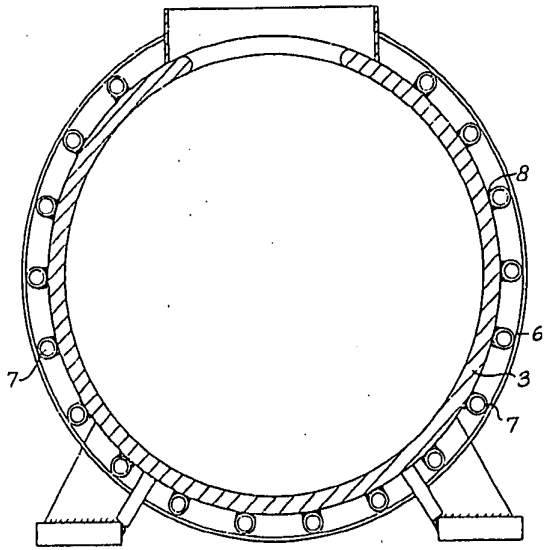

Fig.2

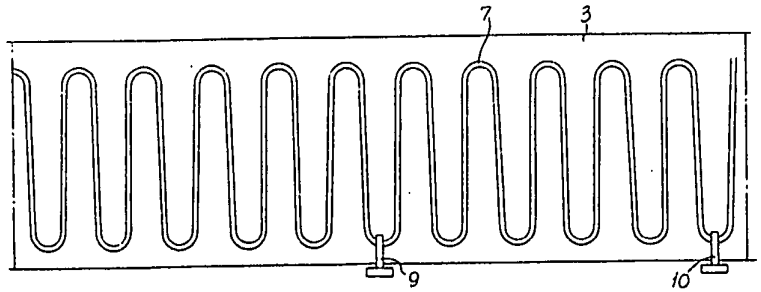

Fig.3.